Remarks

Claims 1-20 are pending. Claims 8-14 have been withdrawn from consideration. Independent Claims 1 and 15 have been amended to clarify the subject matter being claimed. Specifically, Claims 1 and 15 have been amended to clarify that the claimed nozzle apparatus is configured to 'atomize' wash liquid as it exists the nozzle apparatus. Since this feature has been previously claimed and considered (see Claims 1 & 15, for example), no new matter has been added. Support for the claim amendments may be found, for example, at pg. 4, lns. 5-7 of the specification.

Claims Rejected under 35 USC §103

The Applicants acknowledge the rejection of Claims 1-7 and 15-20 under §103(a) as being unpatentable over Jones (US Patent No. 2,235,258) or Lauderback (US Patent No. 2,928,611) in view of the Examiner's Official Notice. The Applicants respectfully disagree and note that neither Jones nor Lauderback discloses an 'atomizing' feature nor a spray angle of > 0° - 80°, as further discussed below. Moreover, the Applicants respectfully submit that the Examiner's Official Notice is erroneous, insofar as the junction point range defined by the Applicants (i.e., 5-30 cm) would <u>not</u> be determined by routine experimentation. To the contrary, the Applicants determined the defined range, at least in part, to achieve an effective atomization of fluid droplets. Notably, neither Jones nor Lauderback would experiment with junction distances, as none are concerned with atomization of droplets, but are instead aimed at achieving other features. As further discussed below, Jones is directed to creating uniform liquid droplets and a desired v-shaped fluid pattern, and to that end provides a formula that results in a junction point that is <u>far less</u> than the range defined by the Applicants range. Lauderback, on the other hand, is completely unconcerned with a junction distance, and in fact, only requires that jets (of

water) impinge forwardly of the nozzle. As a result, Lauderback would have no motivation or desire to experiment to determine junction distances, as such distances are irrelevant to the Lauderback apparatus.

Claim 1 of the present application is directed to a novel nozzle apparatus that comprises a number of orifices, each comprising means for **atomizing liquid**. This means for atomizing includes orifice openings, each angled towards a center axis at a junction pint that is between **5-30 cm** from said orifice openings. Further, the orifices are configured so that liquid emanates from said orifice openings having a spray angle of **≥ 0°** - 80°.

Notably, the nozzle apparatus of Claim 1 *atomizes* liquid as it is dispensed from the nozzle orifices. (*see* pg. 4, lns. 5-7). As will be appreciated by those of skill in the art, *atomizing* is a term of art used to describe the process of causing liquid droplets to collide, thereby breaking them down into considerably smaller droplets having a particular droplet size. These smaller liquid droplets may then be used for injection into a gas turbine unit, for example.

As explained throughout the Applicants' specification, injecting atomized droplets into a gas turbine unit is preferred over injecting non-atomized droplets for many reasons. Most notably, injecting atomized droplets into the turbine unit prevents erosion that may occur as a result of collisions between larger, non-atomized droplets of liquid and the turbine unit's rotor and/or stator blades, for example. (*see* pg. 3, lns. 22-26). In addition, atomized droplets are preferred over smaller-than-atomized droplets, as the atomized droplets provide for more effective wetting of the turbine unit's components. (*Id.*)

Once the liquid is atomized, streams of atomized liquid meet and are combined at a junction point that is between 5-30 cm from each orifice opening. This junction point was particularly determined to give each liquid stream the opportunity to atomize (upon exiting each

orifice openings) prior to reaching the junction point, <u>and</u> to create a combined stream of atomized liquid with an increased impingement force. (*see* pg. 12, lns. 12-18). Indeed, if the junction point were outside of the determined range, the droplet size may not have the opportunity to fully atomize (thereby resulting in larger than desired droplets), or alternatively, the combined stream would fail to produce an effective wetting of a turbine unit's internal components and/or an increased impingement force.

Turning now to Jones, it is noted that Jones is directed to a nozzle "for the purpose of extinguishing fires..." (*see* pg. 1, first column, lns. 1-7). To that end, Jones describes a fire extinguishing nozzle that is "...designed and intended to produce a spray pattern of essentially a V-shape", wherein the droplets are of uniform size and wherein dripping is prevented (*see* pg. 2, 1st col. at lns. 49-54, & 2nd col. at lns. 25-32). Notably, both the v-shaped pattern and uniform droplet size are essential for the Jones nozzle to effectively extinguish fires. Indeed, failure to achieve any one of these two characteristics would render the Jones nozzle apparatus inoperable, and ineffective for its intended purpose.

Unlike Claim 1, Jones fails to disclose *atomizing* the liquid that emanates from the nozzle orifices. Although Jones recognizes that colliding droplets break down into smaller droplets, Jones fails to disclose breaking down the droplets to the point where they are *atomized.* Instead, Jones describes colliding the droplets so as to produce droplets that are uniform in size, and in such a manner that produces a v-shaped stream. (*see* pg. 2, 1st col. at lns. 49-54, & 2nd col. at lns. 25-32). It is by producing the uniform droplets and v-shaped stream that Jones is able to achieve its desired effect of cooling objects that are undergoing combustion. (*see* pg. 1, 1st col. At lns 37-41).

Claim 1, on the other hand, is not intended to cool combusting objects. Instead, the nozzle of Claim 1 is directed to produce a spray stream that is suitable for injecting into a turbine unit without causing erosion to the turbine unit's internal components which, as noted above, can occur if the droplets are too large. To that end, the nozzle of Claim 1 first atomizes liquid droplets, before combining the atomized droplets to form a stream (of atomized droplets) that is suitable for injection into the turbine unit.

Further, unlike Claim 1, Jones fails to define a junction point of 5-30 cm which, as noted above, enables liquid droplets to atomize before they are combining into a stream. Instead, Jones requires a junction point that, practically speaking, is far less than the Applicants' range. According to Jones, the distance at which liquid streams exiting its nozzle orifices are to combine must be less than twice the diameter of the orifice. (*see* pg. 2, 2nd col. at lns. 46-54). Failure to maintain this ratio, notes Jones, would prevent the nozzle from achieving uniformity of droplet size, the desired v-shaped pattern, and/ or would cause dripping. (*see* pg. 2, 2nd col. at lns. 33-39). In other words, failing to abide by the distance ratio would render the Jones nozzle inoperable. Thus, in order to achieve a junction point within the Applicants' range (i.e., 5-30 cm), the Jones nozzle would have to include orifice openings of **≥2.5 cm**. As will be understood by those of skill in the art, orifice openings of this size would result in very large droplets that are too large for injection into turbine units.

Notably, the Jones apparatus was specifically designed to create uniform droplets and to create a v-shaped stream, and not "for the purpose of impinging the surface at a specific distance[.]", as alleged by the Examiner. As a result, Jones would not undergo routine experimentation to define a junction point that would result in impinging a particular surface at a specific distance. Indeed, Jones is not concerned with impinging a surface at any specific

distance, but is instead motivated to maintain a uniform droplet size and to create a v-shaped stream. To that end, Jones utilizes the aforementioned distance-orifice ratio, as opposed to a defined junction point as in Claim 1.

Therefore, the Applicants submit that a junction point of 5-30 cm would not be determined by Jones through routine experimentation, as alleged by the Examiner. To the contrary, Jones experimentation would have been directed to maintaining uniform droplet sizes, forming v-shaped spray patterns, and preventing dripping. As a result, Jones experimentation would involve experimenting with various orifice sizes and spray angles, and not with distances of a particular junction point.

Moreover, unlike Claim 1, Jones fails to disclose a spray angle of $\geq$0° to 80°. Instead, as correctly noted by the Examiner, Jones merely discloses a 0° spray angle. Those of skill in the art would understand that the 0° of Jones is necessary to ensure uniformity of water droplets and to ensure that the desired v-shaped stream is produced. Indeed, if the spray angle of Jones were increased to greater than 0°, the resulting stream would not achieve the desired v-shape, nor would it include uniform droplets.

Therefore, since Jones fails to disclose each and every feature of Claim 1, and since the junction point of Claim 1 would not be determined by routine experimentation, the Applicants submit that Claim 1, Claim 15, and all claims that depend thereon are all fully patentable over Jones.

Turning now to Lauderback, it is noted that Lauderback also discloses a fire extinguishing nozzle apparatus, and like Jones, fails to disclose *atomizing* liquid prior to combining the liquid into a stream of atomized droplets, a junction point that is in the range of 5-30 cm, and a spray angle of $\geq$0° to 80°.

Lauderback discloses a fire extinguishing nozzle apparatus directed primarily to projecting an effective *blanket of foam*, although said apparatus may be utilized to project a solid stream of water or a cone fog. (*see* col. 1, lns 46-50). To that end, Lauderback discloses a nozzle apparatus for mechanically producing foam, said apparatus including a nozzle head (12) that defines passages (25) provided by drilled holes arranged in two concentric circles with the axes of all holes converging upon a single point on the nozzle axis. (*see* col. 1, lns. 59-62; and col. 4, lns. 53-73).

Notably, the drilled holes are arranged such that jets of water issuing from the holes (25) evacuate the interior of the hollow stream of water issuing from the mouth of the nozzle, which creates a low pressure zone inside the hollow stream. This low pressure draws a large volume of air through the center of the water stream which, according to Lauderback, is effective for aerating the water stream. To create the desire foam blanket, a foaming agent is introduced into the water stream, and as a result of the aerating and the impingement of the jets (of water) upon one another in the aerated center, a large foam blanket is produced. (*see* col. 5, lns. 11-27).

Unlike Claim 1, however, Lauderback fails to disclose *atomizing* a liquid for purposes of impinging on a surface at a desired distance. Instead, Lauderback describes creating a foam blanket. At best, Lauderback discloses creating a 'cone of fog' which, as known to those of skill in the art, is a fluid structure that is very different and distinct from that of a stream of atomized droplets. Most notably, a cone of fog could not be effective for impinging on a surface at a given distance, nor for providing effective wetting of internal turbine components.

Further, Lauderback fails to disclose a junction point in the range of 5-30 cm. Instead, Lauderback explicitly notes that no specific converging point is necessary. All that is needed is that the jets impinge forwardly of the nozzle, either on the nozzle axis or elsewhere within the

hollow stream. (*see* col. 6, lns 25-30). Since a junction point is unimportant to Lauderback, Lauderback would have no motivation nor desire to experiment to determine junction distances. As a result, Lauderback would not have conducted routine experimentation to determine the Applicants' defined range of 5-30 cm, as alleged by the Examiner.

Moreover, unlike Claim 1, Lauderback fails to disclose a spray angle of $\geq 0°$ to 80°. Instead, as correctly noted by the Examiner, Lauderback merely discloses a 0° spray angle.

Therefore, since Lauderback fails to disclose each and every feature of Claim 1, and since the junction point of Claim 1 would not be determined by routine experimentation, the Applicants submit that Claim 1, Claim 15, and all claims that depend thereon are all fully patentable over Lauderback.

New Claims 21-27

New Claims 21-27 are directed to methods of washing a gas turbine unit. Notably, the method steps of these new claims recite subject matter already contained throughout Claims 1-7 and 15-30, and as a result, do not add new matter. For reasons set forth below, entry of new Claims 21-27 into the Official Record is respectfully requested.

According to the MPEP, related apparatus and process claims may only be subject to a restriction requirement if: 1) the process as claimed can be practiced by another *materially* different apparatus or by hand, or 2) the apparatus as claimed can be used to practice another *materially* different process. (*see* MPEP §806.05(e)).

Notably, the method of Claims 21-27 explicitly recite using the particular apparatus recited in Claims 1-7. For example, method Claim 21 recites providing a nozzle comprising: 1) an intake end and an outlet end; 2) a number of orifices connected to the outlet end; 3) means for atomizing wash liquid; 4) orifices directed at an angle towards a junction point at a distance

within a range of 5-30 cm; and 5) orifices having a spray angle in the range of >0°-80°. Therefore, the method of Claims 21-27 may not be practiced using apparatus that is materially different to the apparatus of Claims 1-7.

Further, given the particular configuration of the apparatus of Claims 1-7, such apparatus may not be used to practice a method that is materially different from the methods of Claims 21-27. As a result, each of new Claims 21-27 are sufficiently related to the apparatus of Claims 1-7 and should therefore, be examined together with pending Claims 1-7 and 15-20, free of any restriction requirements.

Turning once again to Jones and Lauderback, neither of these two references discloses each and every feature of new Claims 21-27. As noted above, neither Jones nor Lauderback discloses *atomizing* liquid, a junction point at *5-30 cm*, nor a *spray angle of >0°- 80°*. As a result, new Claims 21-27 are also fully patentable over both Jones and Lauderback, whether alone or in combination.

Conclusion

In view of the foregoing, the Applicants submit that the entire Application is now in condition for allowance, which action is earnestly requested.

Respectfully submitted,

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